Surface Navy Combat Systems Development Strategy Update

Presented to the Surface Navy Association

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PEO Integrated Warfare Systems
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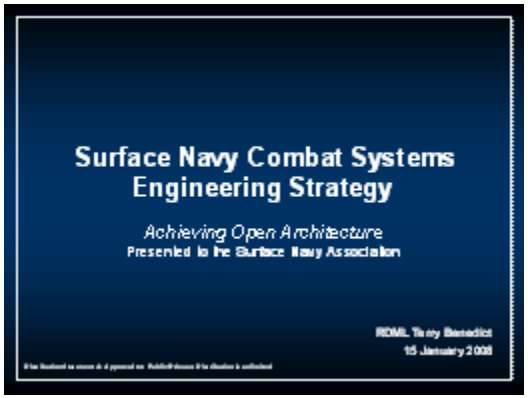
SNA Symposium 15 January 2008

- 2008 Strategy Goals:
  - ☑ – Decouple hardware from software
  - ☑ – Componentize combat systems architecture and common information standards – government owned architecture and interfaces
  - ☑ – Establish a combat system product line approach based on a common objective architecture
  - ☑ – Decouple combat system development from platform development while continuing to accommodate platform specific needs
  - ☑ – Compete where and when appropriate



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Looking Ahead to Advanced Capability Build (ACB) 12 and Beyond

- Combat Systems must transition to a network-based COTS Computing Environment to support future warfighting improvements
- System Engineering Guidance has been documented, will be updated based on experience
- We will continue the transition to a network-based COTS Computing Environment as fast as feasible
- Competitions are being conducted when and where appropriate

Increased computing power and network-based performance will enable significant combat system warfighting improvements

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Surface Navy Combat System

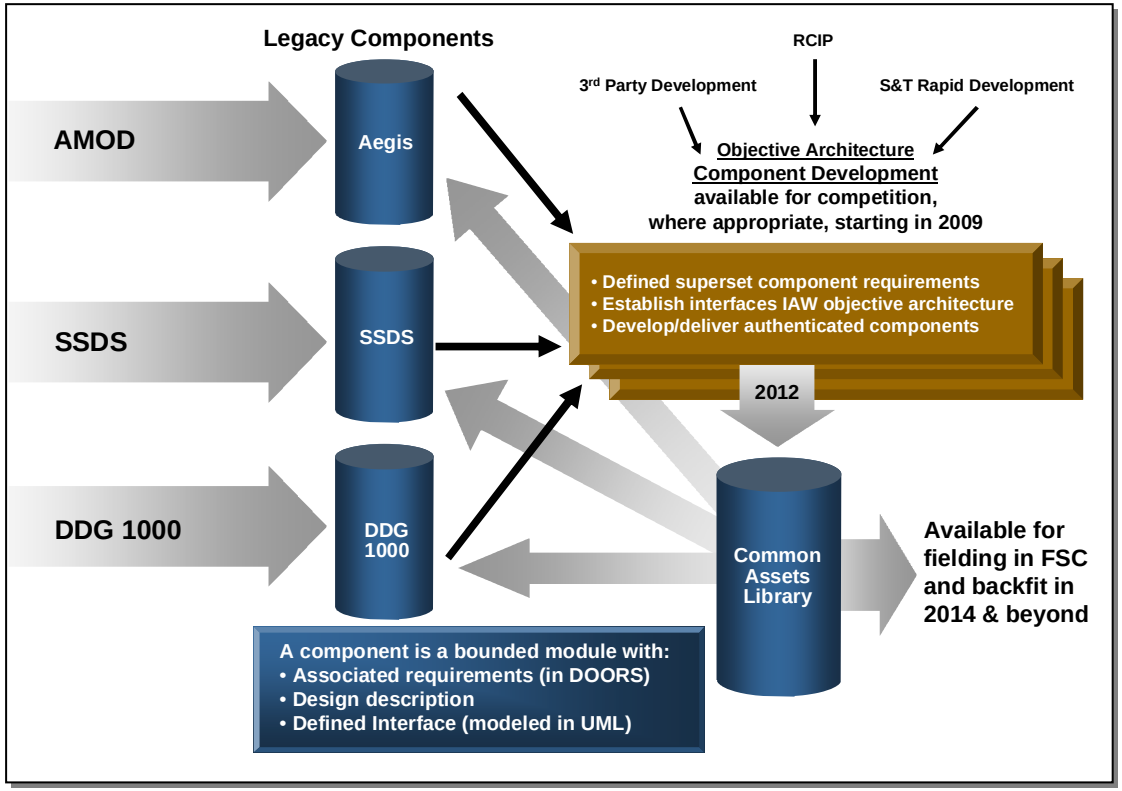
Transition to Objective Architecture On Track

As of November 2009

- Decoupling of Software from Hardware on NIMITZ & BUNKER HILL completed ✓
- NIMITZ final SSDS Software Cert completed June 09 ✓
- BUNKER HILL CSSQT successfully completed 30 July 09 ✓
- BUNKER HILL Software Cert completed November 09 ✓

2012

- Aegis modernization (ACB 12) component level interfaces delivered at CDR (1Qtr FY10) and with each delivered computer program build ✓
- SSDS interfaces already documented at component level ✓
- Small number of common components integrated in both Aegis & SSDS-ACB 12



2014 - 2022

- Number of common components will increase with each ACB eventually moving to a common software core for all Surface Navy Combat Systems
- Required warfighting capabilities will determine which components modified

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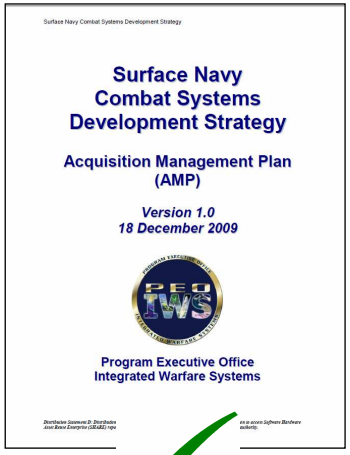
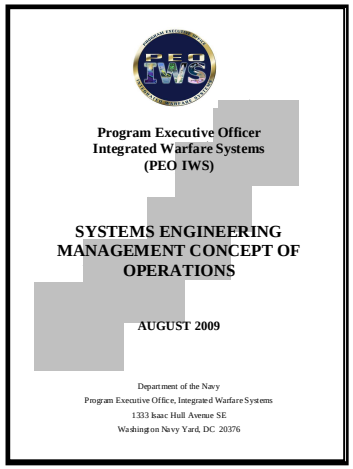
PEO IWS System Engineering Guidance





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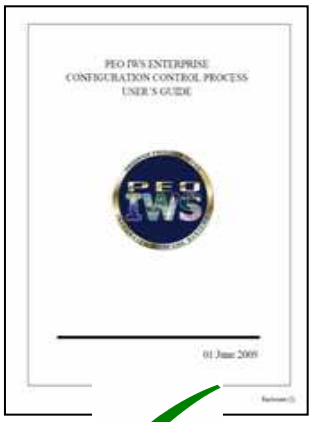

System Engineering Guidance to align PEO IWS' efforts beginning with POM 12

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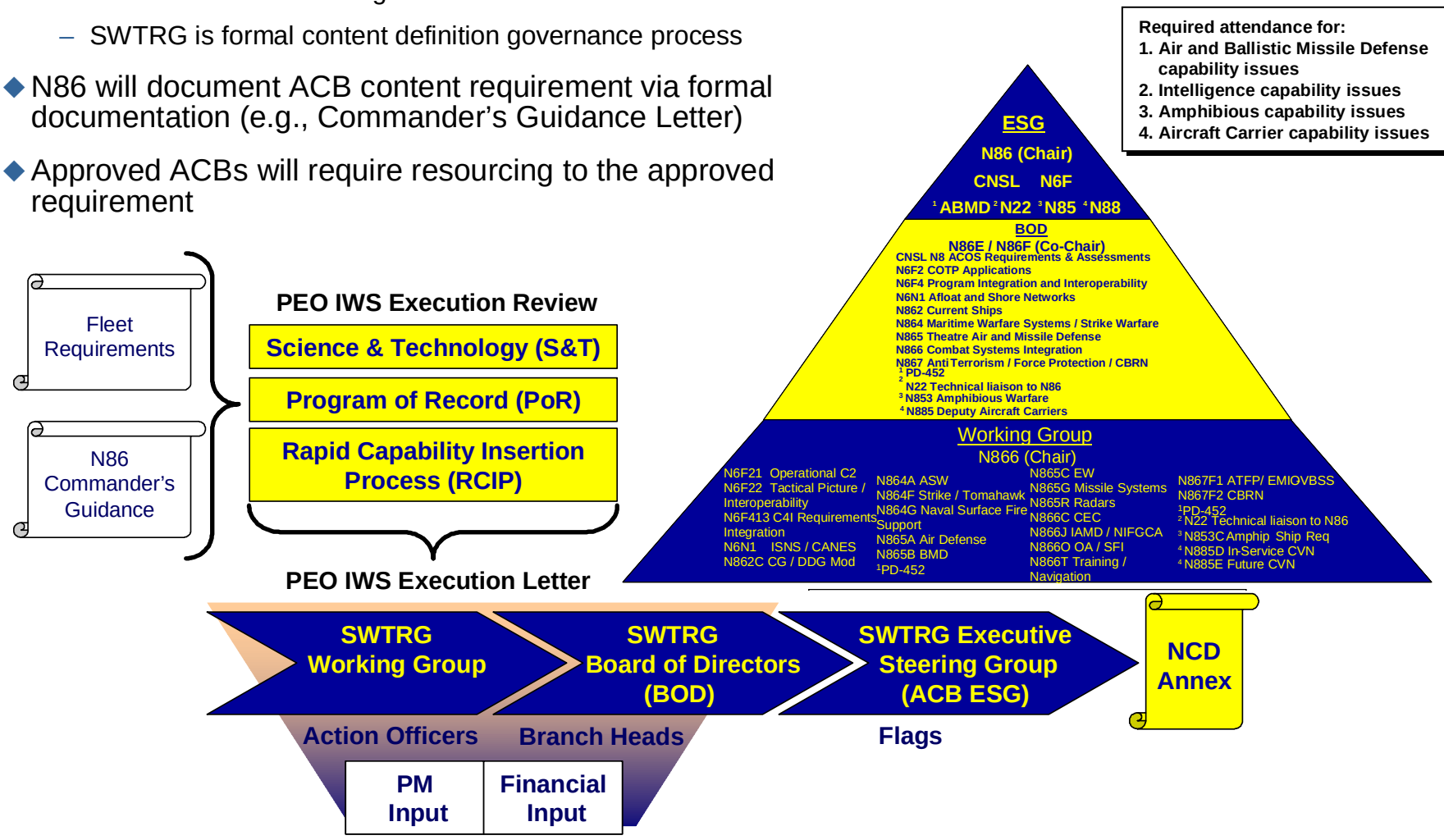
Surface Warfare Tactical Requirements Group (SWTRG)
ACB Content Definition Process

- N86 defined Advanced Capability Build (ACB) content for the Acquisition Community
  - Informal, collaborative approach between Action Officers and PEO IWS SIPMs / MPMs for content definition and alignment
  - SWTRG is formal content definition governance process
- N86 will document ACB content requirement via formal documentation (e.g., Commander's Guidance Letter)
- Approved ACBs will require resourcing to the approved requirement



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Major Warfighting Capabilities Delivered Through Advanced Capability Builds (ACBs)

- **ACB 08**
  - Decoupled software from hardware with COTS
- **ACB 12**
  - Network-based COTS computing environment with significant computing performance improvements (AMOD)
  - Common Processor System (CPS) / Common Display System (CDS)
  - Common Track Manager / Track Server components in SSDS (CVN 78) and AMOD ships
  - Initial MH-60R capability (CVN)
  - Naval Integrated Fire Control – Counter Air (NIFC-CA) (AMOD)
  - Ballistic Missile Defense (BMD) Capability 5.0 (AMOD)
  - SM-6 (AMOD)
- **ACB 14**
  - MH-60R Control Common Components will be introduced into SSDS and Aegis Combat Systems Across ACB 14 & 16 as development funding permits
  - Full ACB 14 definition under development in conjunction with POM 12

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Aegis Weapon System Hardware Architecture Roadmap

	Pre-Aegis	B/L 1/2/3/4/5 DDG 51-78 CG 47-73	B/L 6 Ph I/III DDG 79-90 CG 66 & 69	B/L 7 Ph I DDG 91-112	ACB 08/TI 08 Advanced Capability Build (ACB) Technology Insertion (TI)	ACB 12/TI 12	ACB 16/TI 16
Year	1960	1980	1994	2002	2009	2012	2016
Weapon System							
	MIL Spec Design	MIL Spec Design	Mixed COTS and MILSpec Design	Mission Critical Enclosure (MCE) All COTS computers	(MCE) A Scaleable Pool of Interchangeable Processors	Common Processing System (CPS) & MCE A Scaleable Pool of Interchangeable Processors	Common Processing System (CPS) & MCE A Scaleable Pool of Interchangeable Processors
Processors	UYK-7	UYK-7 UYK-20 / UYK-43 UYK-44	UYK-43/44+ Adjunct COTS	COTS SMP's	COTS Blades	COTS Blades	COTS TBD
Normalized Equivalent Capability	2 UYK-43	4 UYK-43	120 UYK-43	270 UYK-43	875 UYK-43	~2500 UYK-43	TBD
Displays	UYH-4	UYH-4	UYQ-21 (TGC)	UYQ-21/UYQ-70	Thin Client Displays	Thin Client Displays	Common Display Systems (CDS)
Connectivity	All NTDS	Point-to-Point	Point-to-Point	Point-to-Point	All Network Pub Sub	All Network Pub Sub	

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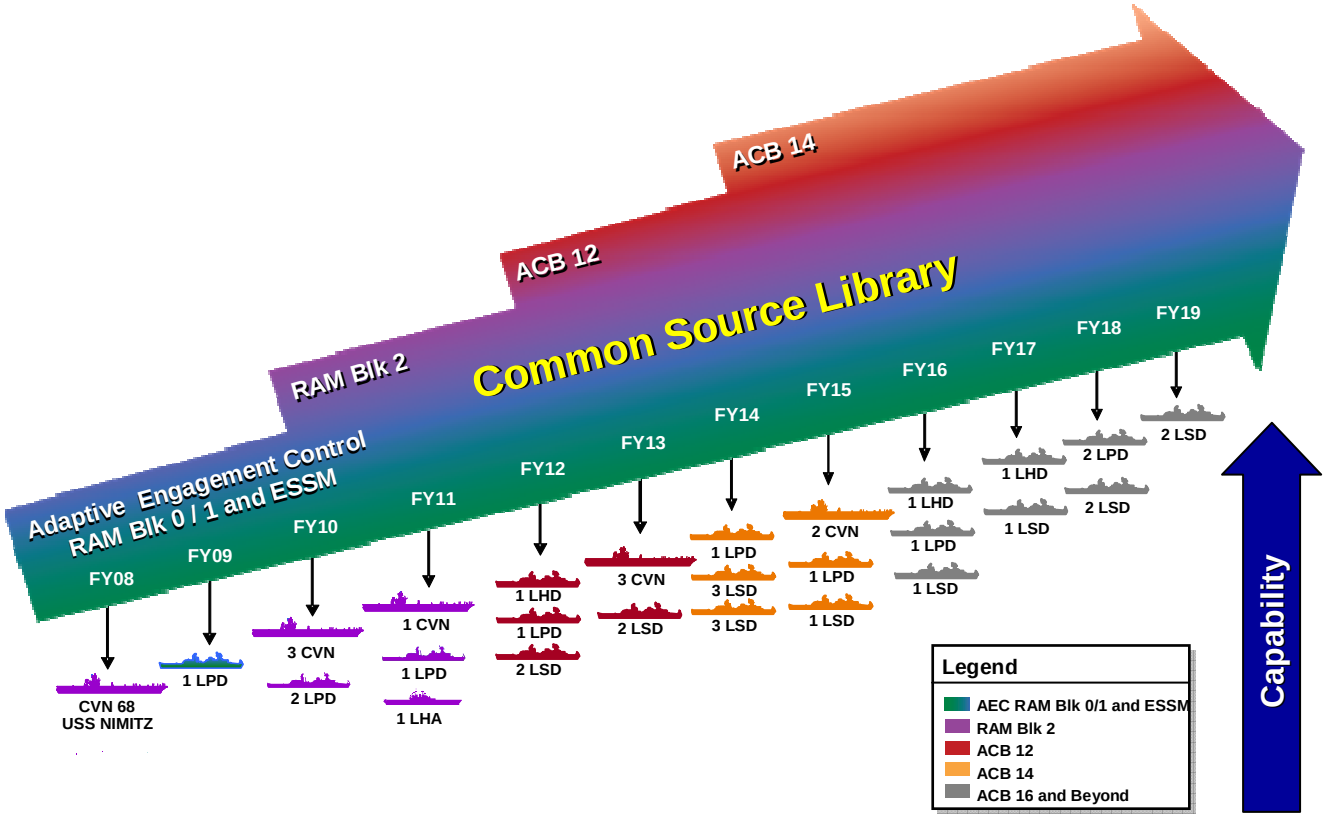
SSDS Combat System Transition to Open Architecture

- SSDS used modular design and development to fulfill self defense requirements across multiple platform types with existing combat system elements
- SSDS MK 2 OA adds flexibility to accommodate change (threat, sensors, weapons, requirements, ship class modifications)
- Computing infrastructure common with Aegis middleware fielded in NIMITZ FY08



Open Computing Hardware is Foundation for New Capability

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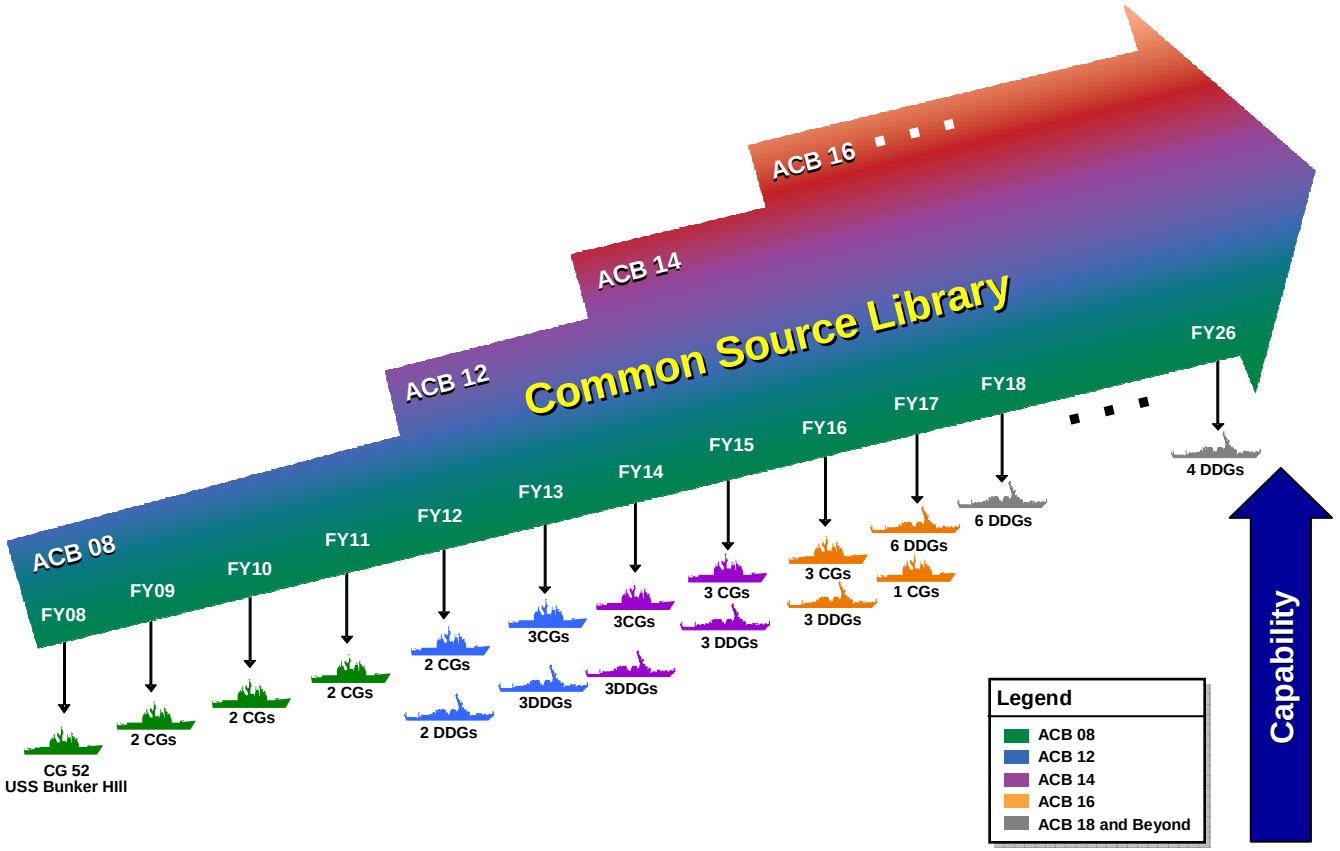
Aegis Combat System Transition to Open Architecture

- The AEGIS system was initially designed as an integrated and tightly coupled hardware and software Combat System
- OA-based ACB08 / TI08 (CR2) hardware and software installed in BUNKER HILL in FY08 using modular design
- Computing infrastructure common with SSDS middleware fielded in BUNKER HILL FY08
- CG 47 Class completion Network-based Open Architecture Computing Environment in 2017
- POM 10 Estimates for DDG 51 Class Show Transitioning
  - 3 ships/year FY12-16
  - 6 ships/year FY17-on
- DDG 51 Class will complete Transitioning to Network-based Open Architecture Computing Environment in 2026



Open Computing Hardware is Foundation for New Capability

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Transitioning to Objective Architecture Based Combat System

2008

- Aegis designed as an integrated combat system
- Aegis ACB 08 / TI 08 decoupled hardware from software
- SSDS designed with federated combat system network and hardware decoupled from software
- SSDS ACB 08 adds open standard middleware
- Future capability improvements planned for both programs through Advanced Capability Build (ACB)

2012

- Aegis modernization (ACB 12) component level interfaces delivered at CDR (1Qtr FY10) and with each delivered computer program build
- SSDS interfaces already documented at component level
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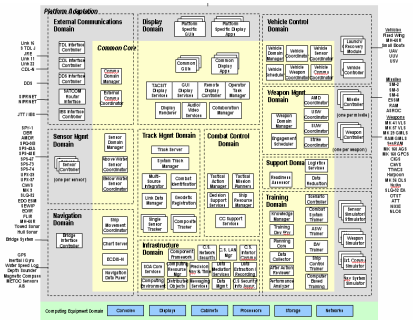
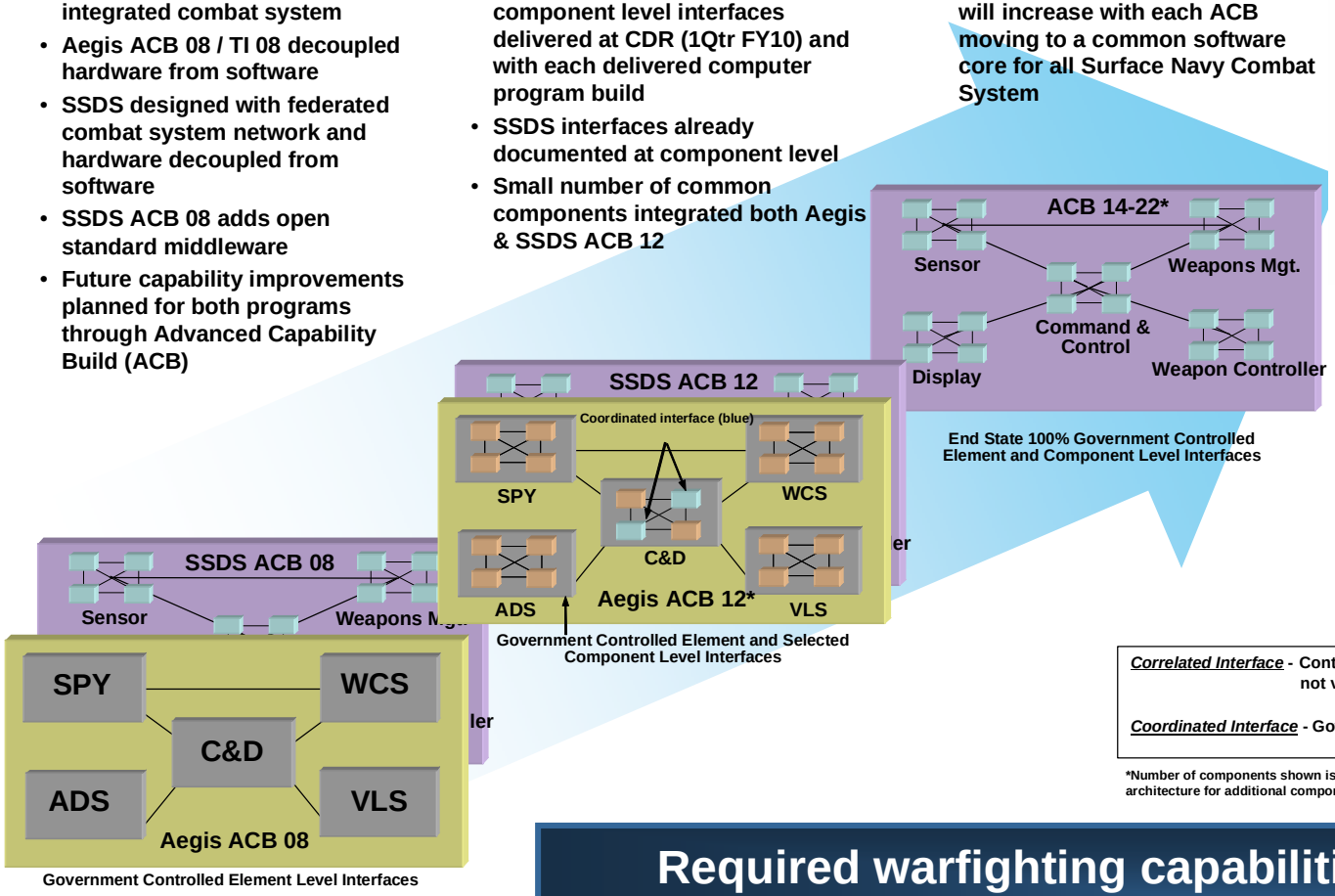
2014-2022

- Number of common components will increase with each ACB moving to a common software core for all Surface Navy Combat System

Objective Architecture





Correlated Interface - Contractor described & controlled; not vetted through government coordination process

Coordinated Interface - Government Controlled and Validated

*Number of components shown is limited for illustrative purposes. Refer to ADD or top level objective architecture for additional component decomposition

Required warfighting capabilities determine components modified

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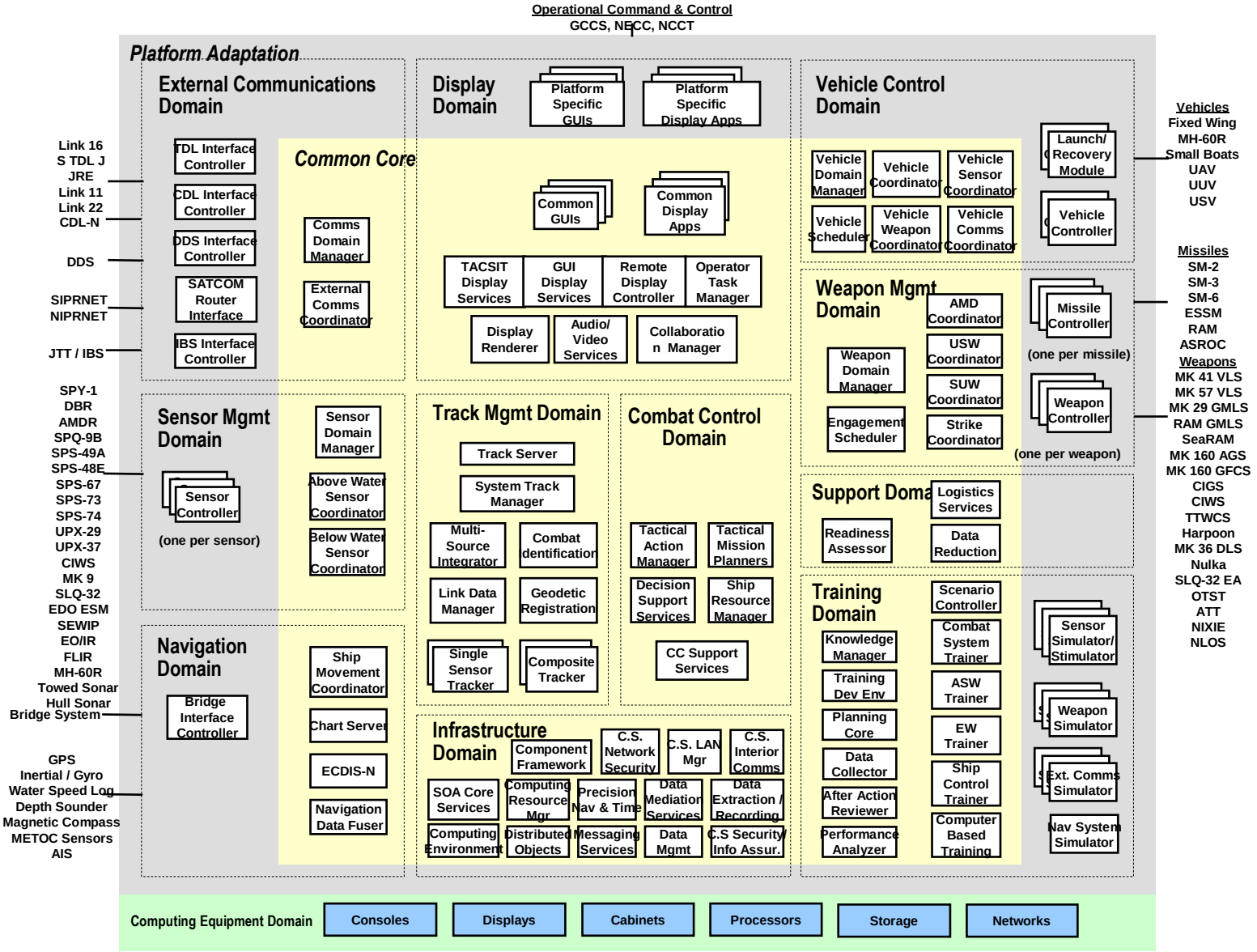
Surface Combat System Top Level Architecture



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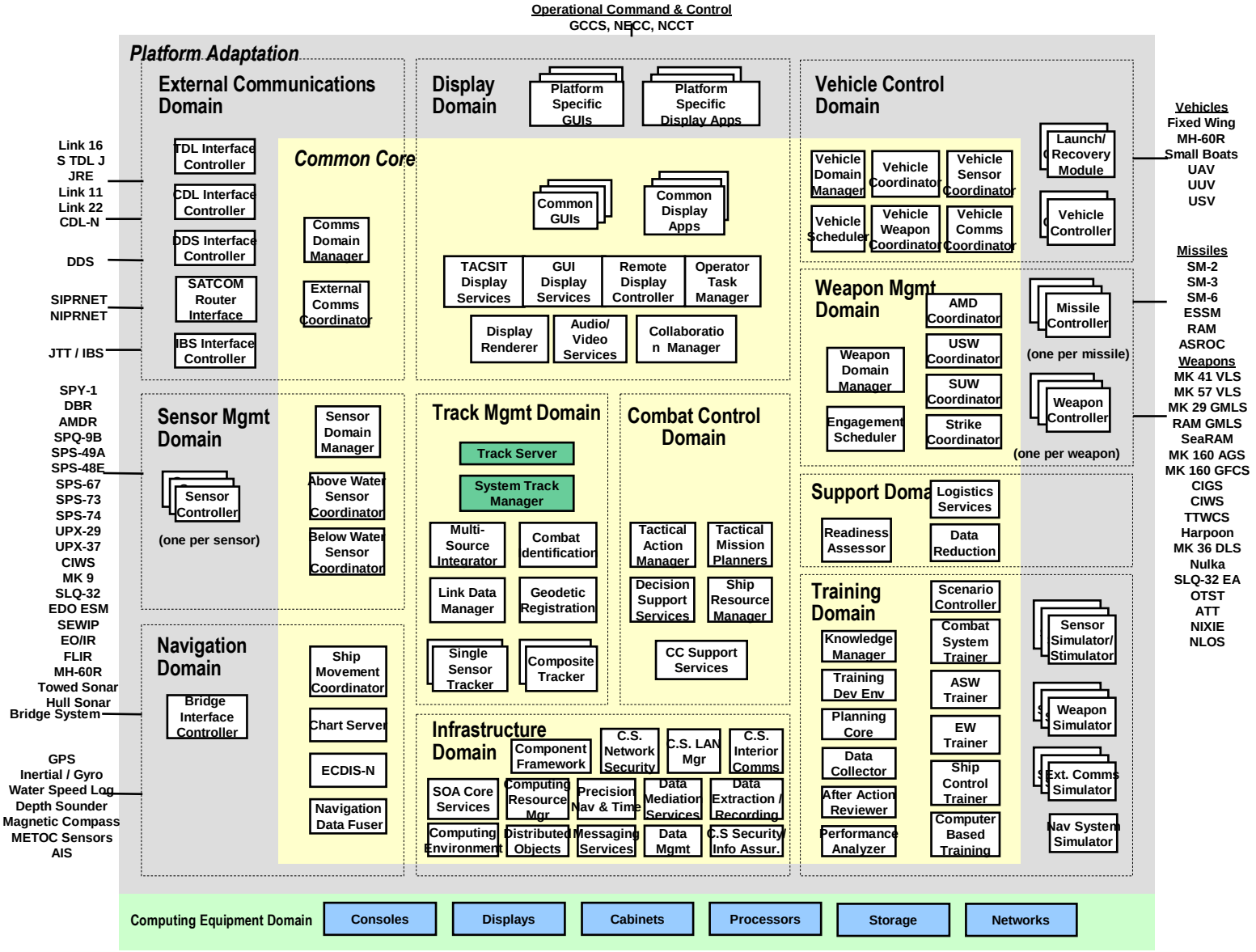
Surface Combat System Top Level Architecture
(ACB 12) Common Track Manager / Track Server Components



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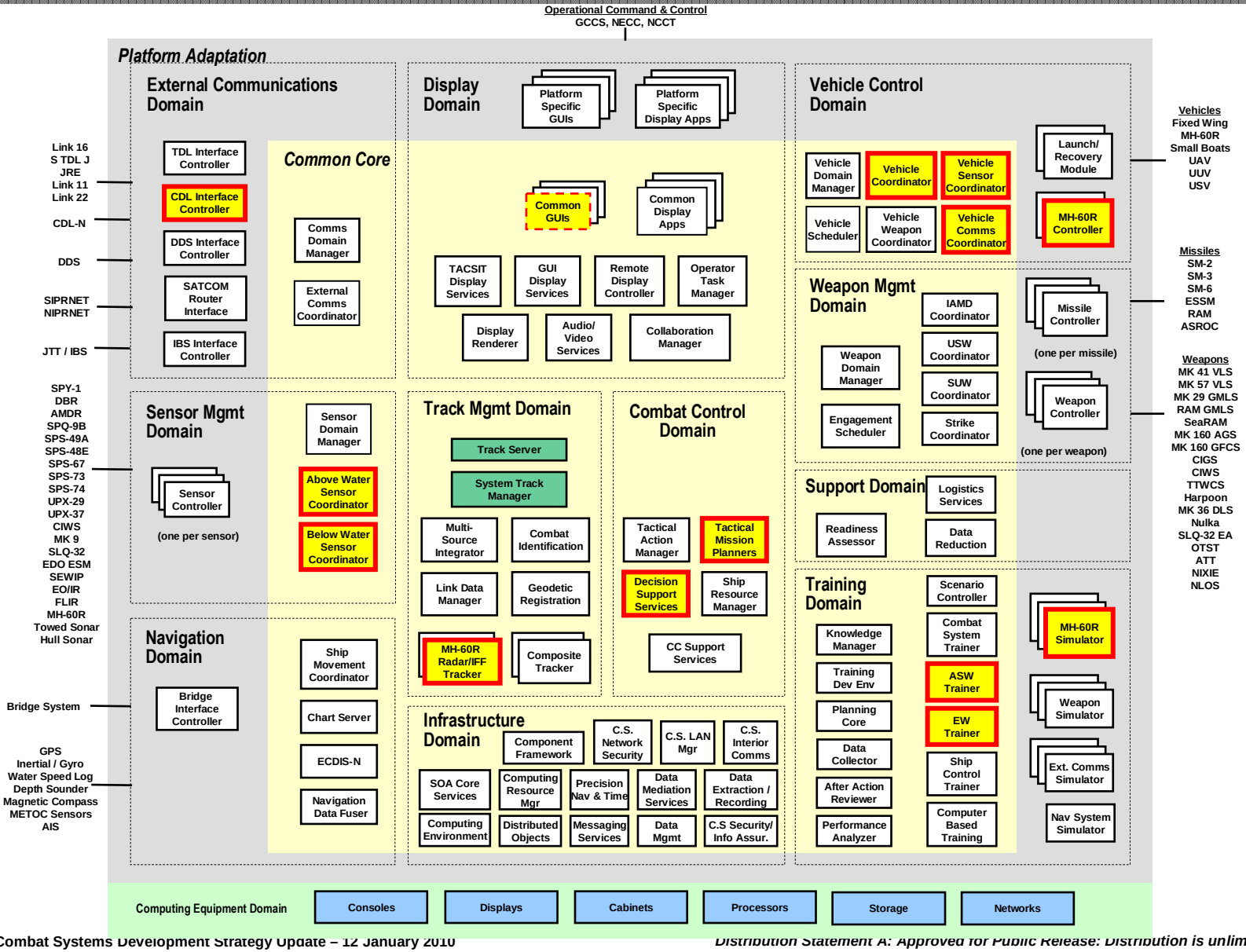
Surface Combat System Top Level Architecture Phasing Common MH-60R Vehicle Control Components in ACB 14 Through ACB 16



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Combat Systems Engineering Strategy Summary

- Transitioning to network-based COTS computing environment which enables significant computing and warfighting improvements in current and future force
- Establishing a Combat System based on a common objective architecture with products applicable to multiple ship classes
  - Government owned architecture and authenticated interfaces
- Conducting Combat System development through disciplined systems engineering principles and processes
- Future Surface Combat Systems will be created from existing and new development components

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